REMARKS

Applicant hereby responds to the Office Action dated November 1, 2005, in the above-referenced patent application. Clams 1-25 are pending in the above-referenced patent application. Claims 4-6, 8, 9, 16-18, 20, 21 and 23-25 were objected to, but deemed allowable if rewritten in independent form including limitations of base claims and any intervening claims. Applicant wishes to thank the Examiner for detailing the allowable claims.

Claims 1, 2, 10-14 and 22 were rejected under 35 U.S.C. 102(e) as being anticipated by US 20020027610 to Jiang et al. ("Jiang"). Claims 3 and 15 were rejected under 35 U.S.C. 103(a) as being unpatentable over Jiang in view of USPN 6,122,017 to Taubman. Claims 7 and 19 were rejected under 35 U.S.C. 103(a) as being unpatentable over Jiang in view of Taubman and USPN 6,275,259 to Gowda et al ("Gowda").

Interview Summary

Applicant wishes to thank the Examiner for courtesies shown to Applicant's representative in the phone interview of December 1, 2005, in which limitations of Claim 1 and response to Examiner's questions in the Office Action of November 1, 2005, were discussed. Applicant argued that the limitations of forming frame difference signal, forming a point-wise motion detection signal, computing a region-wise motion detection signal and forming a motion decision value, are not disclosed by Jiang. The Examiner repeated the arguments in the Office

Action. Further, the Examiner indicated that showing how one cannot detect motion utilizing the luminance difference in cited reference Jiang, may overcome the rejections over the Jiang reference. Further, the Examiner indicated that showing that forming a point-wise motion detection signal is different from determining absolute value of (C_1-C_{-1}) (i.e., $|C_1-C_{-1}|$) in Jiang, may overcome the rejections over the Jiang reference. The Examiner also indicated that amending claim language for forming a point-wise motion detection signal to match function *f* in Fig. 3 of the specification, may overcome the rejections over the Jiang reference. No agreement was reached.

Rejection of Claims 1, 2, 10-14 and 22 under 35 U.S.C. 102(e)

Rejection of Claims 1, 2, 10-14 and 22 under 35 U.S.C. 102(e) as being anticipated by Jiang is respectfully traversed because, for at least the following reasons, Jiang does not disclose all of the claimed limitations.

As per **Claim 1**, it is respectfully submitted that despite the Patent Office's interpretation, Jiang, does not disclose a method of computing a motion decision value, by:

Step a - inputting a video signal with an interlaced video sequence of fields,

Step b - computing a frame difference signal from a difference between a previous field and a next field in the video sequence,

Step c - forming a point-wise motion detection signal from the frame difference

signal,

Step d - computing a region-wise motion detection signal from the point-wise motion detection signal and an adjacent point-wise motion detection signal delayed by one field, and

Step e - forming from the region-wise motion detection signal a motion decision value, as required by Claim 1.

First: On page 4 of the Office Action, paragraph b, the Examiner interprets Jiang (Fig. 3 and Paragraph 23) to disclose C_1-C_{-1} as frame difference signal calculated by unit 107, and to anticipate computing a frame difference signal in Step b above. Then, on page 4 of the Office Action, paragraph c, the Examiner interprets combination of unit 107 and/or 109 (Fig. 1) to generate $\Delta c = |C_1-C_{-1}|$, and to generate anticipate forming a point-wise motion detection signal in Step c above. The Examiner further stated that in the simplest sense, motion metric Δc (i.e., $|C_1-C_{-1}|$) will be the point-wise motion detection signal.

In the aforementioned interview, the Examiner stated that showing that forming a point-wise motion detection signal, as claimed, is different from Jiang's determination of $|C_1-C_{-1}|$, overcomes the rejection over Jiang. In the following Applicant establishes that difference:

1. In Jiang, C_1 represents luminance value of a pixel in field f_1 and C_{-1}

represents luminance value of a pixel in field f_{-1}. In Fig. 3 and Paragraph 23 and 24, Jiang states that five *pixel luminance value differences* Δc, Δn, Δs, Δa and Δb are obtained, wherein $\Delta c = |C_1 - C_{-1}|$. As such Δc is a *pixel luminance value difference*, rather than point-wise motion detection signal, as claimed.

2. According to an embodiment of the present invention, in Step b above a frame difference signal D_n is computed as $D_n = |x_{n+1} - x_{n-1}|$, which is associated with changes that occurred between fields x_{n+1} and x_{n-1} in a frame (e.g., see specification page 17, lines 14-20). Next, in Step c above, a point-wise motion detection signal f_n is computed based on D_n (e.g., see specification page 17, line 20 to page 18, line 10, wherein f_n is a function of d_n, where $d_n = \text{LPF}(D_n)$). Clearly then, determining the luminance value difference $\Delta c = |C_1 - C_{-1}|$ in Jiang, is not the same as computing a point-wise motion detection signal f_n from the frame difference signal D_n in Step c above, as claimed.

3. The Examiner further stated that in the simplest sense, the motion metric Δc (i.e., $|C_1 - C_{-1}|$) will be the point-wise motion detection signal as claimed herein. However, as noted, Jiang defines $\Delta c = |C_1 - C_{-1}|$ as pixel luminance value difference, not a point-wise motion detection signal. In Jiang, $\Delta c = |C_1 - C_{-1}|$ by itself does not provide a point-wise motion detection signal, as claimed. Indeed Jiang in Paragraph 26 Jiang states

that the *pixel luminance value differences* Δc, Δn, Δs, Δa and Δb are low pass filtered by the filter 108 to smooth them and the filtered versions are supplied to the motion detector 109 to detect motion to detect motion metric Δ of the missing pixel. Further, in Paragraph 27, Jiang describes the motion detector 109 detecting motion of a missing pixel as follows:

> "The motion metric Δ at a missing pixel may be defined by employing some combination of the obtained pixel luminance value differences, for example, by $\Delta=\max(\Delta_c, \Delta_a)$.... It is also important to note that our implementation is significantly simplified because the motion values are computed directly from the pixel luminance value differences *employing the minimum and maximum value choices.*" (emphasis added).

Accordingly, for at least these reasons, it is respectfully submitted that forming a point-wise motion detection signal, as claimed, is different from Jiang's determination of $|C_1-C_{-1}|$. As such, rejection of Claim 1 should be withdrawn.

Further, it is respectfully submitted that contrary to the description in Jiang, the Examiner is improperly interpreting Jiang's pixel luminance value differences Δc, Δn and Δs both as the claimed "frame difference signals" in Step b above, and as the claimed "point-wise motion detection signals" in Step c above. However, Jiang only discloses the pixel luminance value

differences Δc, Δn, Δs, Δa and Δb, determined by the difference unit 107. Further, in Jiang Δc, Δn, Δs are simply pixel luminance value differences computed by the unit 107. In addition, the values Δc, Δn, Δs are pixel luminance value differences and not point-wise motion detection signals that are formed from frame difference signals, as claimed. Unlike Jiang, according to the claimed invention, first a frame difference signal is computed from a difference between a previous field and a next field in the video sequence (Step b above), and then a point-wise motion detection signal is formed from the frame difference signal (Step c above).

Second: On page 4 of the Office Action, paragraph d, the Examiner interprets unit 109 computing max/min of region as regional motion metric Δ, to anticipate computing a region-wise motion detection signal in Step d above. The Examiner states that (C_1-C_{-1}), which is used to derive motion metric Δc, is utilized to compute regional motion metric $\Delta=\max(\Delta_c, \Delta_a)$. However, as discussed, Jiang states that Δc is *pixel luminance value difference*, and motion value Δ is computed directly from the pixel luminance value differences employing the minimum and maximum value choices (i.e., $\Delta=\max(\Delta_c, \Delta_a)$). There is no step in Jiang where a region-wise motion detection signal is computed from the point-wise motion detection signal and an adjacent point-wise motion detection signal delayed by one field, as claimed.

Where does Jiang disclose a point-wise motion detection signal and an adjacent point-wise motion detection signal delayed by one field, which are utilized to calculate a region-wise

motion detection signal? Even according to the Examiner's own interpretation of Jiang, (C_1-C_{-1}) is a frame difference signal, not a point-wise motion detection signal and an adjacent point-wise motion detection signal delayed by one field. Further, as noted, Jiang explicitly states that C_1 represents luminance value of a pixel in field f_1 and C_{-1} represents luminance value of a pixel in field f_{-1}. Further Δc is computed from luminance values C_1 and C_{-1}, not from a point-wise motion detection signal and an adjacent point-wise motion detection signal delayed by one field, as claimed. As such, Jiang does not disclose Step d above.

Third: Then, on Page 5 of the Office Action, paragraph e, the Examiner interprets Jiang's units 110 and 111 to filter motion metrics from unit 109 to obtain weight (blending factor) for frame or field interpolation, and to anticipate forming from a region-wise motion detection signal a motion decision value in Step e above. However, it is clear that Jiang does not form a motion decision value from the region-wise motion detection signal, because Jiang explicitly states that: "*It is also important to note that our implementation is significantly simplified because the motion values are computed directly from the pixel luminance value differences employing the minimum and maximum value choice.*" (paragraph 27, emphasis added). As such, Jiang first calculates pixel luminance value differences Δc, Δn, Δs, Δa and Δb, and then calculates motion values Δ directly from those pixel luminance value differences. By contrast, according to the present invention, a method of computing a motion decision value, includes the steps of: computing a frame difference signal from a difference between a previous

field and a next field in the video sequence, forming a point-wise motion detection signal from the frame difference signal, computing a region-wise motion detection signal from the point-wise motion detection signal and an adjacent point-wise motion detection signal delayed by one field, and forming from the region-wise motion detection signal a motion decision value, as required by Claim 1. As detailed above, Jiang does not disclose all of the claimed limitations.

For these additional reasons, it is respectfully submitted that rejection of Claim 1, and all claims dependent therefrom, should be withdrawn. Similarly, rejection of **Claim 13**, and all claims dependent therefrom, should be withdrawn for at lease the reasons provided in relation to rejection of Claim 1.

As per **Claim 11**, Jiang, paragraph 42, does not disclose: "varying the motion decision value between 0 and 1 as a function of an estimate of the degree of motion at the given location and, upon estimating a high degree of motion, heavily weighting the output signal towards the spatially interpolated signal and, upon estimating a low degree of motion, heavily weighting the output signal towards the temporally interpolated signal," as required by Claim 11.

Applicant submits that the blending factor in Jiang is not the same as the motion decision value as claimed. In rejecting Claim 1, the Examiner stated that Jiang's motion metric value Δ is

the same as the claimed motion decision value. How is the blending factor in Jiang the same as the motion decision value as claimed?

Where does Jiang state that its blending factor is the same as the motion metric value Δ?

Why is the Examiner ignoring the difference between the motion metric value Δ, and the blending factor, in Jiang? In paragraph 42, Jiang shows two distinct columns, one being motion metric value and the other the blending factor.

In rejecting Claim 1, the Examiner stated that Jiang's motion metric value Δ is the same as the claimed motion decision value. In paragraph 42, Jiang shows the *motion metric value* Δ varying between 0 and 8, not between 0 and 1, as claimed. Even if in Jiang the blending factor varies between 0 and 1, that is immaterial to the claimed limitation since as claimed, the motion decision value varies between 0 and 1.

In addition, as claimed, upon estimating a high degree of motion (e.g., motion decision close to 1), the output signal is heavily weighted towards the spatially interpolated signal, and upon estimating a low degree of motion (e.g., motion decision close to 0), the output signal is heavily weighted towards the temporally interpolated signal. By contrast, the blending factor in Jiang has the values of 0 for motion metric values 0, 1, 2 and 3.

Fig. 5 in Jiang is explained in Paragraphss 40 and 41 as a graphical representation of a look up table including blending factors that may be used in the interpolation. The look up table is represented as a stretched sinusoidal curve, where the blending factor has 8-bit values. Jiang states that the curve shown in Fig. 5 has significant effects on the quality of the de-interlaced images. Shifting the curve to the left causes more pixels to be interpolated based on field, and therefore reducing aliasing. On the other hand, shifting the curve to the right may increase aliasing. The look up table of Fig. 5 yields the blending factor based on the supplied median motion metric output from spatial median filter 110. Then, the blending factors are supplied to the blender 112.

It is respectfully submitted that there is no disclosure of the claimed limitations in Fig. 5 or corresponding description in Jiang as the Examiner interprets. If Claim 11 is one again rejected, Application respectfully requests the Examine to specifically support the interpretation that Jiang's Fig. 5 discloses any of the claimed limitations. For at least these reasons, rejection of Claim 11 should be withdrawn.

Further, in paragraph 43, Jiang states that any motion metric value of less than 4 yields a blending factor of 0 and any motion metric value of 8 or more yields a blending factor 1. For at least these reasons, rejection of **Claim 12** should be withdrawn.

Rejection of Claims 3, 7, 15 and 19 under 35 U.S.C. 103(a)

Rejection of Claims 3 and 15 under 35 U.S.C. 103(a) as being unpatenable over Jiang in view of Taubman is respectfully traversed because the references, alone or in combination, do not disclose all of the claimed limitations.

As per **Claim 3**, Jiang does not disclose all of the claimed limitations. For example, as the Patent Office also states, Jiang does not disclose the low-pass filter matrix as claimed herein. Further, no such low-pass filtering matrix is suggested by Jiang. Further, unlike the claimed invention, Taubman is directed to providing motion-compensated multi-field enhancement of still images. In addition, Taubman does not disclose a two-dimensional matrix as claimed.

There is no suggestion in Jiang to modify it according to Taubman as the Patent Office does. It is well settled that in order for a modification or combination of the prior art to be valid, the prior art itself must suggest the modification or combination, "...invention cannot be found obvious unless there was some **explicit** teaching or suggestion in the art to motivate one of ordinary skill to combine elements so as to create the same invention." *Winner International Royalty Corp. v. Wang*, No. 96-2107, 48 USPQ.2d 1139, 1140 (D.C.D.C. 1998) (emphasis added). "The prior art **must provide** one of ordinary skill in the art the **motivation** to make the proposed molecular modifications needed to arrive at the claimed compound." *In re Jones*, 958 F.2d 347, 21 USPQ.2d 1941, 1944 (Fed. Cir. 1992) (emphasis added).

Jiang does not suggest the motivation to modify it as proposed. Jiang and Taubman are individually complete and functionally independent for their limited specific purposes and there would be no reason to make the modification proposed by the Patent Office. Therefore, because the references do not suggest the modification proposed by the Patent Office the modifications is improper. Further, it is respectfully submitted that the Patent Office is improperly using "hindsight" and the teachings of Applicant's own claimed invention in order to modify Jiang to render Applicants' claims obvious. No prima facie case of obviousness has been established. For at least these reasons, rejection of Claim 3 should be withdrawn. For similar reasons, rejection of **Claim 15** should be withdrawn.

Rejection of Claims 7 and 19 under 35 U.S.C. 103(a) as being unpatentable over Jiang in view of Taubman and Gowda is respectfully traversed because the references, alone or in combination, do not disclose all of the claimed limitations.

As per **Claim 7**, as the Patent Office also states, Jiang and/or Taubman do not disclose low-pass filtering the region-wise motion detection signal prior to the outputting step, as required by Claim 7. As noted in relation to Claim 1, Jiang does not disclose forming a point-wise motion detection signal and then computing a region-wise motion detection signal from the point-wise motion detection signal and an adjacent point-wise motion detection signal delayed by one field.

Further, Jiang cannot, and does not disclose, low-pass filtering the region-wise motion detection signal before output. There is no such component/feature in Jiang. The Patent Office has summarily decided that the claimed limitation is obvious, and a matter of design choice, without meeting its burden. No prima facie case of obviousness has been established. Further, unlike the claimed invention, Gowda is directed to a digital automatic gain control circuit for image system. In col. 3, lines 10-21 (relied on by the Examiner), Gowda mentions an optional low pass filter 112 for the DAC 110 in Fig. 1. This has nothing to do with the claimed limitation of low-pass filtering the region-wise motion detection signal prior to the outputting, as claimed.

Jiang does not suggest the motivation to modify it as proposed. Jiang and Gowda are individually complete and functionally independent for their limited specific purposes and there would be no reason to make the modification proposed by the Patent Office. Therefore, because Jiang does not suggest the modification proposed by the Patent Office the modifications is improper. The LPF 108 in Jiang has nothing to do with low-pass filtering the region-wise motion detection signal prior to the outputting step, as claimed. Further, it is respectfully submitted that the Patent Office is improperly using "hindsight" and the teachings of Applicant's own claimed invention in order to modify Jiang to render Applicants' claims obvious. For at least these reasons, rejection of Claim 7 should be withdrawn. For similar reasons, rejection of **Claim 19** should be withdrawn.

CONCLUSION

For these and other reasons, it is respectfully submitted that the rejection should be withdrawn, and all of the claims be allowed. Accordingly, reexamination, reconsideration and allowance of all the claims are respectfully requested.

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1/24/6

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